

U.S. DOE's "Recycling End-of-Life Vehicles of the Future" Program

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Objective of the OATT/LWM Recycle Program*

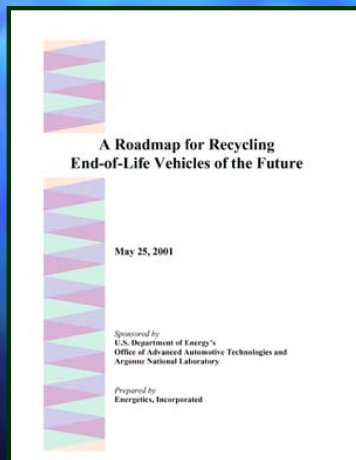
- *To ensure that all materials/components can be cost-effectively recycled*
- *To ensure that materials are not de-selected for the lack of recyclability*

*U.S. DOE's Office of Advanced Transportation Technology/ Lightweight Materials Program

Automotive Recycling

- *75% of automotive materials, primarily metals, are recycled*
- *The other 25%---about 5 million ton/yr of shredder residues, each, in North America, Europe and the Pacific Rim are not recycled*
- *Advanced designs and materials present new recycling challenges*

A Roadmap for Recycling ELV's of the Future Prepared in May 2001



Key Barriers

- Information
- Technology
- Markets

"Recycle Roadmap"

- *Objective of the "Roadmap": to provide overall direction to the OATT recycle program*
- *Workshop held in Sep 2000; workshop facilitated by Energetics*
- *Roadmap completed in May 2001*
(<http://pe.es.anl.gov>)

"Recycle Roadmap" Workshop Attendees

- *Albany Research Center*
- *The Aluminum Association*
- *American Plastics Council*
- *Argonne National Laboratory*
- *Automotive Parts Rebuilders Assoc.*
- *DaimlerChrysler Corp.*
- *Department of Natural Resources, Canada*
- *Ford Motor Co.*
- *General Motors Corp.*
- *Institute of Scrap Recycling Industries*
- *Massachusetts Institute of Technology*
- *Oak Ridge National Laboratory*
- *Rochester Institute of Technology*
- *Steel Recycling Institute*
- *Sandia National Laboratory*
- *US DOE*

Challenges Impacting Auto Recycling in 2020

- Economic value of recovered materials and components
- Material content of vehicles
- Competing vehicle design requirements
- Capability to separate and sort material
- Hazardous material and contamination
- Capital availability to build infrastructure
- Materials supply
- Regulations impacting recycling
- Consumer opinion

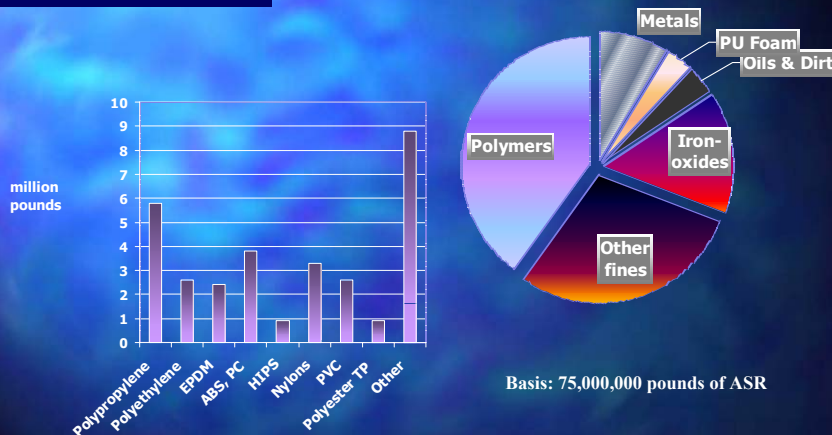
Roadmap Recommendations

- The recyclability of ELV is presently limited by the lack of commercially proven technical capabilities to cost-effectively separate, identify and sort materials and by the lack of profitable post-use markets
- Development of technology to recycle today's materials will provide the basis for recycling of future materials
- Focus should be on post-shred technology demonstration
- Industry-wide collaboration is needed
- Worldwide technology needs to be tracked and information needs to be disseminated to users

Five-year R&D Program Plan Developed

- Goal: Maximize Sustainable Recycling of Current and Future Automotive Materials
- Elements of the Plan
 - Baseline Technology Assessment
 - Materials Recovery Technology Development and Demonstration (includes materials for thermo-chemical conversion)
 - Recovered Materials Performance and Market Evaluation
- Funding
 - ~ \$3 Million per year, 50% govt./50%industry
- Research Agreement
 - Argonne
 - USCAR's Vehicle Recycling Partnership
 - American Plastics Council

Resources Recoverable from Shredder Residue



Path Forward: Fiscal Year 2003 Action Items

- Review with EU, Japan and others to identify a “common platform”
---establish basis for collaboration
- Initiate Baseline Assessment of existing and emerging ELV technologies---establish WEB-based information system
- Support demonstration of materials recovery technology
 - Salyp thermo-plastics sorting technology
 - Argonne froth-flotation technology
- Evaluate technology for removal/control of substances of concern
 - Comparison of surfactants for removal of PCB's

Conclusions

- *As the complexity of automotive materials and systems increases, the technical challenge to recycle these materials and components increases*
- *Ultimately, any new technology developed in response to these changes must have minimal risk:*
 - *Proven cost-effective at full-scale*
 - *Proven markets for products*
 - *Regulatory barriers removed/transactions costs minimized*